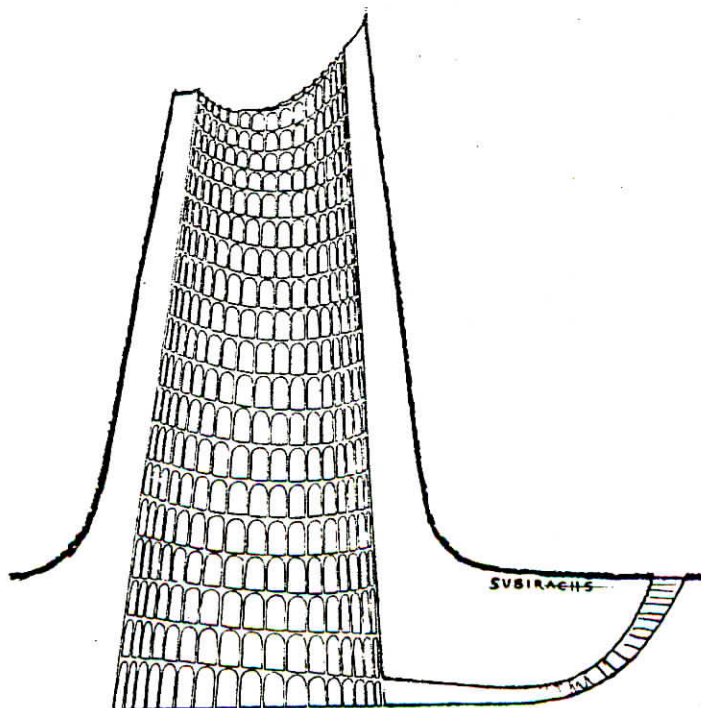

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THE MAXILLARY FIRST PREMOLAR OF AUSTRALOPITHECUS GARUSI I

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Abstract: Description and measurements of the maxillary first premolar of Garusi I. The specimen is referred to Australopithecus afarensis but because A. afarensis remains represent a wide geographic and a broad time range the occlusal crown measures are used for the examination of evolutionary trends.

Tooth measurements are repetitively analysed in paleoanthropological research due to abundance of dental remains and to the role of environmental and genetic factors in odontogenesis.

For discrimination, mesio distal and bucco lingual diameters of tooth crown alone are inappropriate, groove and cusp pattern must be described with anatomically detailed measurements. Measurements may include length, breadth and height of cusps and occlusal surface topology.

In this paper we give anatomically detailed dental measurements to the description of the upper first premolar of Garusi I.

Material. Garusi I consist of a right maxillary fragment with the two premolars and the alveoli of the canine and the two incisors. It was found at Garusi (Tanzania) by Kohl-Larsen the 8 th of February, 1939 in the Laetolil Beds (Kohl-Larsen 1943, Protsch 1981). The Laetolil Beds at Laetoli have yielded in 1974-1975 abundant material including mandibles and teeth of 24 human ancestors that have been dated between 3.59 and 3.77 million years (Leakey et al. 1976, White 1977). The Laetoli remains are weathered and no maxillary bone can be analysed. On the basis of morphology of the two premolars Johanson, White and Coppens (1978) refer the specimen to Australopithecus afarensis (Laetoli and Hadar hominids).

Judging from the alveoli, the upper central incisors of Garusi are not much larger than the lateral incisors. The canine is large and massive with a long straight root. The Garusi hominid seems to be in this respect different from the Laetoli and Hadar hominids (Puech et al 1985 a).

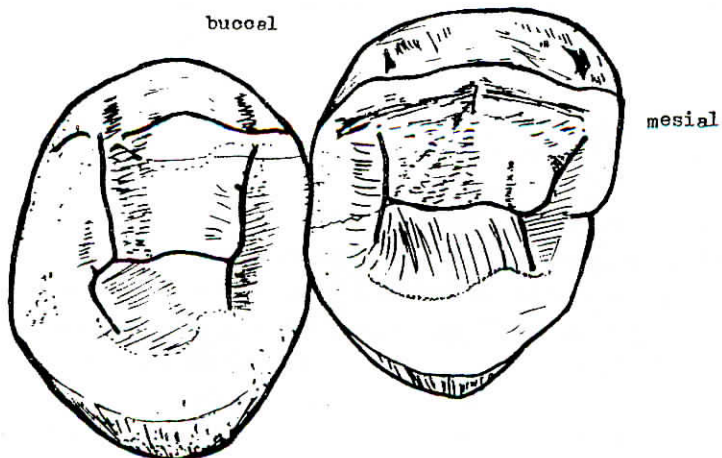
Description. The crown of the permanent first premolar is covered with micropitting which intensifies on the buccal part of the occlusal surface (Puech et al. 1985 b).

Viewed occlusally, crown shape is an oval elongated across its mesio buccal and disto lingual axes, with major buccal and lingual cusps 6.4 mm apart. The lingual cusp is placed mesial of the bucco lingual crown axis. Maximum length of the mesio distal diameter is 9.5 mm (9.7 mm corrected for interproximal wear) and maximum breadth or bucco lingual diameter: 12.45 mm.

The lingual crown face and the buccal face are sloping. The lingual face, 8 mm high, bears a smooth surface with four minor vertical grooves (two lingual, the third mesio lingual the larger and the last situated almost on the mesial face). The face has a basal bulge. The buccal face, 10 mm high, bears two large vertical grooves: the mesial (5 mm) almost twice higher the distal groove (3mm). It has a mesio basal bulge.

The buccal cusp apex is sharper and higher, about 1.4 mm, than the lingual. The mesial slope of the buccal cusp (5mm) is longer than the distal one (3.8 mm) and the distal slope of the lingual cusp (5.3 mm) is nearly twice the mesial one (2.8 mm). The two cusps are

AUSTRALOPITHECUS AFARENSIS GARSI I
upper right premolars



united by two crests converging to the central groove and there separated by Imm.

Primary fissuration is "H" shaped, with poorly developed mesio lingual (1.7 mm) disto buccal (1.7 mm) and disto lingual arms (1.0 mm). The mesio lingual foveal groove is in a straight line whereas the mesio buccal foveal groove (2.8 mm) starts in a mesial direction in continuity of the central groove and after Imm turns buccally. The anterior fovea radiates a small groove which passes across the occlusal margin onto the mesial crown face and ends at the maximum contour of the mesial face. A primitive condition that remind the longitudinal depression indenting the mesial surface of Sivapithecus P³ (GSP II704). The mesial marginal ridge of the occlusal surface is 1.6 mm wide and 4 mm long. The posterior fovea, 4 mm distant from the anterior fovea, is well developed defining a moderate talon. The distal marginal ridge is 2.1 mm wide and 2.6 mm long.

Perikymata are present on the half basal high of the crown. On the distal portion of the lingual face the enamel outermost layer lost reveals the increment lines of enamel on a portion 0.8 mm X 1.5 mm. Occlusal wear is light with no dentine exposure, if almost the entire face is polished wear have maintained the sharpness of the cusps and buccolingually directed microscopic crenulations are present on the distal slope of the lingual cusp. There is a 2.5 mm interproximal contact with the C on the most occluso buccal portion of the mesial face and a larger contact with the P⁴ estimated 3.3 mm. The P³ have three roots, two buccal roots mesio distally compressed but divergents and a more cylindrical lingual root.

Discussion and conclusion. The P³ crown from Garusi is a mesio distally large tooth, 9.7 mm if we correct the interproximal wear, falling squarely in the A. africanus and Homo habilis sample ranges given by Tobias (1978) and out the A. afarensis sample range given by White, Johanson and Kimbel (1981). The bucco lingual diameter, 12.45mm, fall in the A. afarensis and A. africanus sample but outside the H. habilis sample range given by Tobias and in the H. habilis sample range given by Blumenberg and Lloyd (1983) (Table I and Table 2). The Garusi P³ crown has a similar shape to that of Laetoli and Hadar described by White (1977), Johanson and White (1979) and White, Johanson and Kimbel (1981). The crown is occlusally, buccally and lingually asymmetric and normally larger than the P⁴ (Table I). White,

TABLE I

sample/specimen	mesiodistal diameter	buccolingual diameter
MAXILLARY ANTERIOR PREMOLAR (P ³)		
(1) Olduvai <u>H. habilis</u>	8.9 - 10.2	11.2 - 12.3
(2) <u>A. boisei</u>	9.5 - 11.8	13.8 - 17.0
(2) <u>A. africanus</u>	8.7 - 9.6	11.7 - 13.2
(1)(2) Laetoli	8.9 - 9.3	13.0 - 13.4
(2) Hadar	7.5 - 8.9	11.3 - 12.4
(4) Garusi	9.7	12.45
(5) Makapansgat MLD 9	9.9	13.7
MAXILLARY POSTERIOR PREMOLAR (P ⁴)		
(1) Olduvai <u>H. habilis</u>	8.9 - 10.2	11.4 - 12.5
(2) <u>A. boisei</u>	11.7 - 12.4	14.2 - 17.6
(2) <u>A. africanus</u>	8.7 - 10.8	12.7 - 14.2
(1)(2) Laetoli	9.0 - 9.7	-
(2) Hadar	7.6 - 9.5	11.1 - 12.6
(4) Garusi	9.2	12.4
(5) Makapansgat MLD 9	8.5	13.3

TABLE 2 : Comparative dental measurements (in mm) for P³

(3) <u>A. afarensis</u>	M-D 7.1 - 9.3	B-L 11.3 - 13.4
(4) Garusi	M-D 9.5 (e) 9.7	B-L 12.45
(3) <u>A. africanus</u>	M-D 8.5 - 10.1	B-L 10.7 - 13.9
(3) <u>A. robustus</u>	M-D 8.3 - 10.8	B-L 13.2 - 15.3
(3) <u>A. boisei</u>	M-D 10 - 11.7	B-L 13.7 - 17.0
(3) <u>H. habilis</u>	M-D 7.5 - 10.2	B-L 11.1 - 13.9
(3) <u>H. erectus</u>	M-D 7.1 - 9.2	B-L 9.9 - 12.8
(4) Visogliano <u>H. erectus</u>	M-D 10.5	B-L 12.3

- (1) Tobias 1978, (2) White, Johanson and Kimbel 1981,
 (3) Blumenberg and Lloyd 1983, (4) Pusch, Albertini and Roth,
 (5) Wolpoff 1978.

Johanson and Kimbel (1981) have found a reversed situation, P^4 larger than P^3 , in A. africanus, A. robustus and A. boisei. These observations are to be related to reduced canine area of the "robust" australopithecines (Table 3).

TABLE 3 : Comparative dental measurements (in mm) for C; Tobias 1980

<u>A. afarensis</u>	mean M.D. diameter 9.92	mean B.L. diameter 10.94
<u>A. africanus transvaalensis</u>	9.61	9.90
<u>A. robustus crassidens</u>	8.54	9.38

The conclusion of White, Johanson and Kimbel (1981) is that relatively large C and P^3 constitutes the primitive condition also found in early man (Puech and Albertini 1984). This would bring the Makapansgat hominids close to Laetoli and Hadar hominids since MLD 9 have relatively large C and P^3 larger than P^4 (Table I). This relation is denounced by the similar pointed appearance in Garusi, Laetoli and Hadar P^3 lingual cusp opposed to the inflated appearance observed by White, Johanson and Kimbel (1981) in A. africanus (STW 73, MLD 23) and A. robustus (SK 48, 823). When worn the lingual cusp in Garusi and Hadar have distinct mesial and distal wear planes, absent in Laetoli hominid 5, that must be related to the projection of the canine beyond the tooth row at least three millimeters as proposed by Protshch (1981).

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